30. The process of claim 29, wherein the hardness of the Ni-Be alloy is 75% or less of its peak aged hardness.

31. The process of claim 28, wherein the Ni-Be alloy contains at least one additive selected from the group consisting of Al, C, Co, Cr, Cu, Fe, Mg, Mo, Ti, Y and the Rare Earth Elements.

32. A mold or mold insert for contacting a molten metal at elevated temperature, wherein the mold or mold insert is made from an underaged Ni-Be alloy, the amount of Be in the Ni-Be alloy being sufficient Be so that a continuous coating of beryllium oxide will form on the surfaces of the tool when contacted with molten aluminum but not so great that the alloy becomes brittle.

33. The mold or mold insert of claim 32, wherein the alloy contains about 1.0 to less than 3.0 wt.% Be.

34. The mold or mold insert of claim 33, wherein the alloy contains about 1.0 to less than 2.0 wt.% Be.

REMARKS

Claim 4 has been cancelled and the subject matter contained therein added to claim 1. In addition, new claims 15 to 34 have been added to more thoroughly define the subject matter Applicants regard as their invention. Support for the limitations in the new claims can be found in the original claims as well as at page 1, second full paragraph, of the specification. Attached Exhibit 1 identifies the amendments made to claim 1. With the foregoing amendments, claims 1 to 3, 5 to 12 and 15 to 34 are now in the case.

Molds and mold inserts for use in die casting parts made from aluminum and other metals have traditionally been made from iron-based alloys such as H13 tool steel. Although these products work fine, they gradually wear out over time. This is due to a number of factors including formation of cracks ("heat checking"), surface abrasion, dissolution of mold surfaces through alloying ("washout") , and deposition of the metal being molded on the mold's surfaces ("soldering"). Specification, page 1, last full paragraph.

In accordance with the present invention, these problems are reduced or eliminated by forming the mold or mold insert from a beryllium nickel alloy, particularly an underaged beryllium nickel alloy. Molds and mold inserts made from this material, it has been found, resist crack formation better than H13 tool steel. See page 11, line 3 et seq. of the specification,

for example. In addition, these materials exhibit little or no washout or soldering, since they form tightly adherent beryllium oxide coatings when exposed to molten aluminum. Page 4, last full paragraph, of the specification.

The Harkness article cited in the office action of May 14, 2001, does indicate on page 423 that beryllium nickel alloys can be used for making molds and cores used for molding polymers and glass. This does not suggest, however, that such molds and cores could also be used for die casting aluminum and other metals where conditions of pressure, abrasion, etc. are more extreme. Nor does this suggest that such molds and mold cores, when used in this environment, would exhibit the superior properties found by Applicants and demonstrated, for example, in Figures 2 and 3 and page 11 of the specification.

Claims 11, 12, 15 to 21 and 27 to 31

Claim 11 specifies that molten aluminum or other metal is charged into a mold or die made from a beryllium nickel alloy. Similarly, claim 15 claims a die casting apparatus made with such a such a mold or die, while the specification at page 1, second paragraph, makes clear that this apparatus would necessarily include a feed system for charging the molten metal into the die.

The disclosure in Harkness that molds for polymers and glass can be made from beryllium nickel alloys would not suggest that molds for molten metals could be made from these alloys because of the harsher conditions involved. Moreover, this disclosure would clearly not suggest that such molds would exhibit the superior long term crack resistance and enhanced resistance against washout and soldering found by Applicants and demonstrated, for example, on page 11 of the specification. Accordingly, these claims are unobvious and patentable over this reference.

Claims 1 to 3, 5, 6 and 8 to 10 -- Anticipation Rejection

In order for a reference to constitute an anticipation, the subject matter sought to be patented must be identically disclosed in the reference. In re Arkley, 172 USPQ 524 (CCPA 1972).

In Arkley, the prior art reference described a genus including many compounds including the compound claimed. However, in order to achieve the claimed compound from this genus, multiple selections of specific substituents from lists of alternatives had to be made. In other words, in a number of places in the generic formula, the disclosure indicated that a number of

alternatives could be used. In order to achieve the specific compound claimed from this disclosure, a specific alternative had to be selected in each of these places.

In its decision, the Court stated that such a disclosure did not identically disclose the particular compound being claimed. In particular, the Court stated that

> ". . . rejections under 35 USC 102 are proper only when the claimed subject matter *is* identically disclosed or described in "the prior art." Thus, for the instant rejection under 35 USC 102. . .to have been proper, the Flynn reference must clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without *any* need for picking, choosing and combining various disclosures not directly related to each other by the teachings of the cited reference." (emphasis added)

Thus, the Court has made clear that a generic disclosure requiring multiple selections of alternatives to achieve a claimed invention (at least where the generic disclosure encompasses many possibilities) is too unspecific to constitute an anticipation under 35 USC 102.

In this case, there is no reasonable disclosure of a tool being made from an underaged alloy. It is true that one part of Harkness indicates that its alloys can be used to make tools and that another part of Harkness discloses underaged beryllium nickel strip. However, Harkness also discloses many other utilities and many other alloys. Thus, to achieve the claimed invention from Harkness' disclosure, the Examiner has had to pick tools from among the many different utilities disclosed and has had to choose underaged alloys for making these tools. This is precisely the type of picking and choosing the CCPA has condemned in Arkley. Accordingly, it is clear that Harkness is too unspecific to constitute an anticipating disclosure under 35 USC §102.

Claims 1, 10, 16, 23, 28 and 32 -- Obviousness

Each of these claims specifies that the inventive tool is made from an underaged nickel beryllium alloy. Claim 32 further specifies that a mold or mold insert is made from an underaged nickel beryllium alloy.

In the Office Action of May 14, 2001, the Examiner rejects those claims drawn to underaged products on the basis that it is not inventive to discover optimal working conditions by routine experimentation, citing In re Aller, 220 F.2d 454, 105 USPQ 233 (CCPA 1955).

However, implicit in optimization is the reasonable expectation that a change in temperature (or other variable) would affect the results obtained such that optimal results could be obtained by choosing the best temperature (or other variable).

> "Normally, it is to be expected that a change in temperature...would be an unpatentable modification." 105 USPQ at 235

At the same time, however, the court in Aller also recognized that changes in temperature and the like could lead to patentable inventions where an unexpected result, different in kind and not merely degree, is obtained:

> "Under some circumstances, however, changes such as these may impart patentability... if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art." 105 USPQ at 235

In this case, the unexpected result achieved is that the inventive tool grows stronger, resists cracking to a greater degree, and has a longer useful life than tools made from H13 tool steel, the material of choice for making such tools. See page 11 and Figures 1 and 2 of the specification. These results could not have been reasonably predicted from Harkness' disclosure. In other words, Harkness at most only suggests that certain physical properties (e.g. strength, hardness, ductility, etc.) of an alloy can be optimized to a particular utility by suitable selection of composition and aging history. It does not suggest, however, that the performance of the tool over time would be affected by aging conditions. Accordingly, it would not have been obvious from this reference to select an underaged alloy so as to achieve a tool with a longer useful life (as reflected by resistance to surface cracking, washout and soldering), as accomplished in accordance with the present invention, since there is nothing in this reference tying these properties to this variable.

Claims 21 to 27

These claims specify that the tool has a tightly adherent beryllium oxide coating sufficient to substantially prevent aluminum soldering when the tool surface is contacted with molten aluminum.

Even if the beryllium nickel alloys described in Harkness form adherent beryllium oxide coatings when exposed to the atmosphere, as asserted by the Examiner, there is no reasonable suggestion in this reference that such alloys would form beryllium oxide coatings that "substantially prevent aluminum soldering when the [alloy] surface is contacted with molten aluminum," as expressly recited in these claims.

Unexpected results or properties are part of the invention "as a whole" under 35 USC §103. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). Here, persons of ordinary skill

in the relevant art could not have predicted that the tools recited in these claims would exhibit the property recited in these claims. Accordingly, the invention of these claims, as a whole, is unobvious and patentable under the statute.

If any fee is due with this amendment, please charge our deposit account No. 03-0172.

Respectfully submitted,

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EXHIBIT 1

CLAIM AMENDMENTS

1. A tool for contacting a molten metal at elevated temperature, wherein the tool is made from [a] an underaged Ni-Be alloy containing about 1.0 to less than 3.0 wt.% Be.